An Examination of Factors that Account for Differences in the Degree of IPO Underpricing between China and South Korea: A Case for High Technology Sector

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Abstract

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This paper examines the factors for IPO underpricing phenomenon in China and South Korea over the period 2010 to 2014. This paper uses the IPO samples extracted from the technology sector and the sample consists of 164 IPO issues covering the period 2010 and 2014 in these two countries. Besides, the paper examines the relationship between these factors and the degree of IPO underpricing for Chinese and South Korea technology companies.

The paper finds that offer price, D/E ratio and pre-tax income per share play an important role in explaining IPO underpricing for technology sector in China and South Korea. The results confirm that issue size and offer timing has an insignificant effect on initial return.

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Chapter 1: Introduction

1.1 Background and overview

Securities market in China has contributed to the economy since 1990s' when Shenzhen Stock Exchange and Shanghai Stock Exchange were established. This created an avenue for many rapidly growing firms with good investment opportunities to go public since the traditional sources of financing, banks and retained earnings, could not be sufficient enough to undertake new projects.

In the year 2011, more than 2000 listed companies went public in China. Compared to other developed markets, China is less exposed to the uncertainty of the stock market and is not heavily affected by global financial crisis because of the open door policy. The China Securities Regulatory Commission (SCRC) was established in1992 and is charged with the responsibility of monitoring the whole financial market.

China has a relatively short history of securities market, while South Korea established its first security market (the Market Organization) in 1987. In May 1996, the KOSDAQ Securities Exchange was established to offer services to small and intermediate businesses.

Unlike many emerging countries where large number of businesses does not get listed, the South Korea primary market has witnessed a large number of listings in the mid-1990s. From 1990 to 2012 alone, more than 1,796 listed companies went public in South Korea and market capitalization is up to $1.1 trillion.

Previous researchers have presented quite convincing empirical evidence to support the fact that initial public offerings (IPOs) are, on average, underpriced. This is also confirmed for initial public offerings (IPOs) that went public in China in recent years and traded on the Shenzhen Stock Exchange and Shanghai Stock Exchange. As for Korean securities market, just like their Chinese counterparts, IPOs are generally underpriced.

Underpricing is related to abnormal return between offer price and the first trading period market price for initial public offering (IPO). This phenomenon of IPOs is like a puzzle in finance studies (Grinblatt and Hwang 1989). Researchers have confirmed that the extent of underpricing of IPOs varies from country to country.

As shown in Table 1 in Appendix, the weighted average initial return is 137.4% for China while the South Korea weighted average initial return is 61.6%. This implies that in emerging markets the degree of underpricing of IPOs might be significantly higher than the degree of underpricing of IPOs in developed markets. In United States average initial return is 16.8% and in Germany, it is 24.2%.

1.2 Method of pricing

Two methods of pricing shares in an IPO market exist. The first one is to sell the shares at a fixed price. This is the approach used by some countries, including companies in Dubai Financial Market (DIFX). The second is the book building method, popular and used widely and also the DIFX's method of choice (Jonathan 2008).

When companies receive the clearance, their prospectus must indicate the price of IPO, issue date and so on. Securities market is being closely monitored by Chinese government and leaders of economic department would focus on execution of duty on occasion to conduct the standardization of market.

At present securities markets gradually become more market-oriented. That is, the issuer and underwriter could negotiate with each other on the price rather than allowing the Chinese government to set up the preliminary offering price.

1.3 Purpose of study

As a matter of fact, what motivates me to research into this area is that the results would provide useful empirical evidence to investors. I would establish a regression model to test the relationship between underpricing of IPOs, and the issue size, offer price, offer timing, D/E ratio and pretax income per share.

1.4 Structure of research proposal

This paper is organized as follows: Chapter 2 is focus on review of literature, and the various "school of thoughts" that are identified and inferences that are drawn from IPO underpricing. Chapter 3 contains the regression model, data sources, and analysis of the results obtained for "school of thoughts". Chapter 4 is on the analysis of the results obtained from the regression. Chapter 5 contains the summary of the work and suggests some avenues for other further research paper.

Chapter 2: Review of literature

2.1 Explanations of Underpricing of IPOs

Mispricing of IPOs is calculated as the difference between the offer price and real market price at the end of the first day of trades. Especially, underpricing of IPOs is like the pricing of an initial public offering (IPO) below its market value.

Ritter (1984) noted that between 1960 and 1982 in the United States, the average initial return public offerings was trading a price 18.8% higher than its offering price shortly after public trading started for the around 5000 firms that chose to go public during that period. Some evidence indicates that underpricing can be explained by some hypotheses, such as monopoly power enjoyed by investment bankers, winners curse phenomenon, legal issues involving institutional investors and the underwriter or issuing firm. It can also be used as a dynamic strategy to evaluate the market price.

2.1.1. Monopoly power enjoyed by investment bankers

Investment bankers may have monopoly power that they can use to earn profits by underpricing new issues while general commercial banks are barred from entering into equity underwriting. Thus, the rule allows investment bankers to deliberately underprice the new issue. Investment bankers would prefer exercising this right to make investors fit it and make them improved. For the sake of encouraging more investors to participate in financial activities, underwriters usually give investors more incentive by underpricing on the IPO.

However, investment bankers might use this advantage to increase both the spread between the offer price and bid price (OP-BP) as well as the degree to which the offer price is set below the markets' true valuation (P-OP). By underpricing issues a monopolist investment banker can increase the probability of being able to sell the whole issues to outside investors. Therefore, investment bankers have the incentive to underprice the new issues and earn high revenues. Ritter (1998) noted that those underwriters who own better acknowledge about market are using underpricing of IPOs to attract buyers to involve in financial trading.

2.1.2. Winners curse phenomenon

This hypothesis assumes that IPO market consists of two groups of investors: informed investors and uninformed investors. As a matter of fact, Initial public offerings (IPOs) represent a group of shares about which relatively much is unknown when they appear on the market (Anderson et al. 1995). Underpricing can be considered as a mildly good solution in IPO markets in which some investors are viewed as informed while a larger group is viewed as uninformed.

Informed investors, defined as those who expend resources collecting information of IPOs, will bid only for those issues that are superior (underpriced). However, uninformed investors will bid randomly across all issues (superior and inferior) on account for they will not involve in costly search (Rock 1986). Thus, for good issues, uninformed investors get only a small fraction of allotment and informed investors can get a large fraction of allotment in account of informed investors' demand rising. However, the bidders for bad issues will be uninformed investors and they achieve a large fraction of allotment for bad issues and a small fraction of allotment for good issues.

Akerlof (1970) argued that information asymmetry about firm value would lead to the classic 'lemon' or 'adverse selection' problem (A situation where sellers have information that buyers do not about some aspect of product quality or vice versa). In other words, uninformed investors might bid underpriced or overpriced offers due to asymmetry of information, which cause unfair among investors and market inefficiency in the long term.

And underpricing by issuers has been considered as a costly and difficult to imitate signal to convey firm quality to potential investors, who cannot easily tell the difference between good and bad IPOs (Allan and Faulhaber, 1989).

In order to keep large group (uninformed investors) in financial market, underwriters have to underprice new issue and eliminate potential unfairness in future. Rock (1986) said underpricing is necessary to compensate uniformed investors for this winner's curse adverse selection bias and to make them to participate actively in the IPO market.

2.1.3. Legal issues related to the shares

Due diligence is required to exercise by underwriters and firms in order to make sure all information contained in prospectus is justified. Lisa (2007) argued that those investors who hold heavily overpriced issues may have an incentive to sue the underwriters because of misleading and incomplete information. For this reason, underwriter would like to lower the offer price in case the uncertainty of stock market induce underwriter to engage in a lawsuit.

When a company is going to public it needs to show potential buyers a detailed independent report attesting to its financial position. An effective due diligence would become a good tool to show management of companies and quality of shares. Financial due-diligence happens when it is necessary to check whether firms meet the conditions of IPOs (Charles, 2007).

Due diligence investigation is necessary to reveal financial risk and crisis. To move a forward single step, investors can realize and predict the future of companies via reports from underwriters, and their abilities to earn profits. And due diligence investigation is consistent with real conditions of operation and management, on which investing and trading are based.

To avoid these negative effect and damage to their reputation, risk-reverse underwriters may try to keep investors satisfied underpricing IPOs. In other words, when offer price is relatively low underwriter do not take risk of being sued by investors who are not satisfied by information the underwriters have (Thomas, 2013). High returns could bring high risk and underwriter tries to reduce the risk they may have and have to lower the offer price. Hence, legal problems about due diligence failure contribute underwriters to make IPOs underpricing.

2.1.4. Dynamic Strategy

A majority group of firms may try to issue a small portion of shares as IPOs and agree to underprice the new issues. In such manner, firms could monitor the performance of their stocks and the true price. If these shares perform well, later a large portion of shares will come into the secondary market, referred to as second offering. Next, firms with more underpriced IPOs are likely to issue secondary offerings because they have more space to grow in the future.

Welch (1989) noted that approximately one-third of issuers of IPOs from 1977 to 1982 had reissued the equity by 1986, with the typical amount being at least three times the initial offering. However, losses from the primary market are more than compensation by gains from secondary market. To summarize, promoters could use IPOs underpricing to indicate that they have better quality issues than others and, subsequently, raise large amounts of funds from large groups of investors.

Grinblatt and Hwang (1989) argued that underpricing is a signal that this company is good and it is worth investing. A partial offering of stock is issued and sold, then information about the firm is uncovered, subsequently more stock is reissued and sold with a certain extent initial return.

Underwriters would use this kind of dynamic strategy to public new issues so that firms can earn more profits and get more intrinsic value. Ritter (1991) and Loughran (1995) documented that larger and more established IPOs have given returns to their investors over the long run compared to their smaller and younger counterparts.

2.2 Other Empirical evidence from South Korea and China

A majority of research is based on developed countries and regions, such as the United States, Hong Kong, Japan. In recent years studies about emerging markets went along well in local regions, such as South Korea and China. It is very reasonable to choose these two countries to do their proposal because they did a great work on their own countries' conditions.

As a matter of fact, scholars could combine superior western thoughts with their own national conditions and furthermore they could get more realistic results, which would offer too much assistance for government or monitoring department to make a strategic decision.

In the period of 1995 to 2003, the underpricing of 908 IPOs is up to 129% in A shares' market in China when the number is less than 10% in Canada and France (Yihui Liu, 2005). And there are two explanations of Chinese underpricing of IPOs about its national system, which are associated with Chinese special social formation (socialism).

First, there are two kinds of stocks in A shares' market, circulation stock and non-circulation stock. Circulation stock is possible to trade publicly on the stock exchange while non-circulation stock is exclusively belong to government or specific people, and the latter is not good for development of market in account of preventing perfect competition of IPOs market. Shortage of circulation stock causes a phenomenon, called positive cascade, like getting a bonus when investors get offer shares.

Second, strict pricing mechanism and market entries are both closely monitored by China Securities Regulatory Commission (CSRC), which is led by Chinese government. From 2001 until now, "book building" as a method of pricing IPOs has become popular. Issuers and underwriters discuss the price of shares going public, and then predict the potential demand from outside investors.

In South Korea, a new mechanism named as book building was recognized as a method of pricing. As a matter of fact, book building mechanism of IPOs could reduce the effect of underpricing in South Korea.

These two different pricing methods have different effects on finance market, which are associated with a serious underpricing in South Korea. Thus, high underpricing tendency in the IPO market discourages IPOs issued by those companies which cannot afford or do not want underpricing and it makes arbitrage activities in the secondary market and in the grey market. Thus, the underpricing of IPOs hampers the growth opportunities and makes instability in the secondary market in South Korea.

Chapter 3: Data and Methodology

3.1 Source of data

In this paper data from two countries is collect from Bloomberg and I select 164 IPOs samples to perform the test of significance of factors. These data is from technology companies and in the trading process and have gone to public during 2009 to 2014. Global 2008 financial crisis has impact on every countries and data that started from 2009 is more objective.

The degree of underpricing (DUP) is measured by initial return (IR), it is defined as:

$$DUP = (P_t - P_0)/P_0,$$

Where P_t is the closing price at the end of the first trading day and P_0 is the offer price. IR means the initial rate of return of IPO. As I mentioned it above, higher initial return makes higher the degree of underpricing.

If DUP > 0, then the stock is underpriced.

If DUP = 0, then the stock is overpriced.

If DUP < 0, then the stock is correctly priced.

I choose Korean and Chinese IPOs market and use Bloomberg program to search and collect information and data for the pretax income per share, D/E ratio, announcement date, listing date, offer price, offer size and closing price, ticker and company's name.

And the numbers of IPOs sample are both over 100. However, Information of some variables is uncompleted and some companies' historical lines of stock price are delisted during 2009 to

2014. Then 95 IPOs samples of technology companies in Chinese IPOs market and 69 IPOs samples of technology companies in South Korean are chosen to engage in this research. Thus, I choose five variables to complete the model, including offer price, offer timing, and offer size, pretax income per share and D/E ratio.

Offer price from Bloomberg is lightly different from offer price (adjusted). And by searching closing price at the end of first day, I found offer price (adjusted) is more real and reasonable when the initial return is calculated. Thus I choose offer price (adjusted) as the first variable to run the regression.

Offer timing is the difference value between listing date and announcement date. When a company decides to go to public, it would announce the news to the public and get more time to prepare.

Offer size is a factor that is used by previous researches and when the news come out public would choose to judge its uncertainty. Thus, a reasonable offer size would lower risk that outside investors take.

Pretax income per share is a good element to estimate this model. Its function in a model is like a P/E ratio whereas different tax policies in different countries may have different impact on earnings per share because P/E could not reflect different tax policies.

D/E ratio in this paper is total debt divided by total equity. Leverage could influence outside investors' decisions. And D/E ratio could reflect companies' financial conditions.

A complete regression process consists of two steps. The first step is to get the mean and standard deviation of samples by Excel program. The second step is to run the regression model by Stata program. Thereafter, I would analyze the results by comparing the difference between two countries.

3.2 Methodology

Least square regression model is used to evaluate the degree of underpricing which is the dependent variable and independent variables have been mentioned above.

The regression model is expressed as following equation:

$DUP = IR = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$

Where

X_1= Offer Price (adjusted)

X_2 =Log of Offer Timing

X_3 = Log of Offer Size

X_4 = Pretax Income per Share of Issuing Firm

X_5 = D/E Ratio of Issuing Firm

In the equation above, X_1, X_2, X_3, X_4 and X_5 are independent variables. DUP is the dependent variable, α_0 is a constant term, β_1, β_2, β_3, β_4 and β_5 are unknown parameters to be estimated and coefficients of the regression model, ε is the error term which is assumed as $\varepsilon \sim (0, \sigma^2)$.

1. X_1 = Offer Price

Offer price is the price at a broker is willing to sell a certain security. When underwriters set a lower price to go to public, the degree of underpricing might be high along with real price showing. It is fundamental and basic element to complete this research.

Hypothesis 1: A negative correlation between offer price and degree of underpricing.

2. X_2 =Log of Offer Timing

The second is offer timing. In this paper offer timing is defined as the number of days between announcement date and listing date. Longer time for preparation for going public makes information provided by underwriters more specific and closes to real price. Outsider investors tend to rely on information provided by underwriters.

Hypothesis 2: A positive correlation between log of offer timing and degree of underpricing.

3. X_3 = Log of Offer Size

The third is offer size. Offer size is an important factor when scholars write this kind of paper. And higher log of offer size contributes lower uncertainty of company. Thus, there is no need for underwriter to set a lower price when they face less risk. And issuers would like to sell prices at higher prices because such value of firm could improve.

Hypothesis 3: A negative correlation between log of offer size and degree of underpricing.

4. X_4 = Pretax Income per Share of Issuing Firm

The forth is pretax income per share. The different tax policies in different countries may have different impact on earnings per share, that is, pretax income per share is a good element to

estimate this model. Higher pretax income per share makes lower degree of underpricing. Higher pretax income makes investors more confidence about stocks' future.

Hypothesis 4: There is a negative correlation between pre-tax income per share of issuing firm.

5. X_5 = D/E Ratio of Issuing Firm

The fifth is D/E ratio. When a company has a lot debt burden outside investors would not choose the company's shares. However, investors are worried about their future and ability to repay. The second hypothesis is higher D/E ratio makes higher degree of underpricing. When the stock's rating makes investors hold no hope of its rising, it is impossible for them to buy the stock at high price, which makes underwriter has to lower the initial offer price.

Hypothesis 5: There is a positive correlation between D/E ratio and degree of underpricing.

Chapter 4: Analysis and Comparison of Results

4.1 Descriptive statistics of dependent and independent variables

We begin our analysis with descriptive analysis of variables in our model. Table 4.1 shows the descriptive statistics of dependent for China. Table 4.2 also indicates the descriptive statistics of variables for South Korea. Both reveal the mean, standard deviation, maximum, minimum and median of independent variables.

Table 4.1: Descriptive statistics of dependent variables in China

Variable	Sample Size	Mean	Standard Deviation	Max	Min	Median
Offer Price	95	19.35	14.71	66	0.355	19.4
Log of offer size	95	6.34	0.99	10.73	3.83	6.26
Log of offer timing	95	2.66	2.04	6.53	0	3.0
D/E ratio	95	39.144	63.455	516.73	0.1	29.12
Pre-tax Income per share	95	0.304	0.403	1.13	-1.18	0.31

The size of samples is 95. From 2010 to 2014 there are over 100 IPOs happened in China. Whereas not every company's historical line is listed. Thus 95 samples of IPOs are selected.

The mean of offer price of China is 19.35CNY, about 3.15USD, which is extremely low. And maximum offer price is 66RMB, about 10.75USD. The mean of log of offer size is 6.34.

Minimum of log of offer timing is 0, which means offer timing equals 1. When companies announce their planning of going to public in the market investors could bid shares of these companies in the same day. The mean of D/E ratio is 39.144 and pretax income per share is only 0.304CNY, about 0.05USD.

Table 4.2: Descriptive statistics of dependent variables in South Korea

Variable	Sample Size	Mean	Standard Deviation	Max	Min	Median
Offer Price	69	25629	151170	1260000	208	3900
Log of Offer Size	69	8.65	1.83	13.74	5.56	8.85
Log of Offer Timing	69	3.09	1.11	4.30	0	3.53
D/E Ratio	69	175.30	502.194	2695.93	0.18	57.4
Pre-tax Income per share	69	2956.64	22287.98	185034	-3200.12	-12.51

The mean of offer price of South Korea is 25629KRW, about 25.12USD. And maximum of log of offer size is 8.85. It is noticeable for researchers to consider that D/E ratio is 175.30, which is fully high. The mean of pretax income per share is 2956.64KRW, about 2.8USD.

And the initial returns are respectively 12.06% in China and 40% in South Korea. The degree of underpricing of technology industry is higher in South Korea than China in this period.

4.2 Comparison of different independent variables

The mean of offer price is relatively high in South Korea and low in China. This phenomenon is reasonable because South Korea's GDP per capita is much higher than China's, which contributes to lower income per capita in China. Thus, a lower offer price could attract more investment from small investors. Technology industry is more developed and it is a dominant industry in South Korea. There are amounts of high-technology companies, such as Samsung, its products spreads all over the world. Due to intense competition companies tend to choose underprice of IPOs to attract investors to buy their stocks.

Offer size is larger in South Korea, and it result from its economic characteristic. In South Korea large enterprises support the whole national economy and they are called "Chaebol". They can get more financial aids than small business and government would encourage them to go to public to raise fund they need. In the other hand, Chinese government would like to support small-size and medium-size business when they are closely related to the people's livelihood.

Offer timing is longer in South Korea than China. We may suggest that China has less time to prepare for initial public offering after they announce their plans whereas their difference is tiny.

D/E ratio is almost four times in South Korea than China. When a company has a heavy financial burden, it would has an bad impact on the quality and rating of stock and in further step would influence the degree of underprice of IPOs that would be stated in later section.

Pretax income per share is lower in China than in Korea.

4.3 The Results of Regression Model

Table 4.3 shows the result of regression model about China's initial return for technology sector. There are six independent variables in the regression model for China including constant term. Offer size, log of offer timing, log of issuing size, D/E ratio and pretax income are mainly consistent with my expectation.

From the Table 4.3 we could get that the coefficient of constant term is 0.129 (positive) and it means that the initial return is positive when other independent variables are zero.

Table 4.3: the regression result of model in China

Source	SS	df	MS		Number of obs =	95
					F(5, 89) =	10.74
Model	6.00511406	5	1.20102281		Prob > F =	0.0000
Residual	9.95161138	89	.111815858		R-squared =	0.3763
					Adj R-squared =	0.3413
Total	15.9567254	94	.169752398		Root MSE =	.33439

initialret~2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
offerprice	-.0178867	.0027964	-6.40	0.000	-.0234431	-.0123303
logofoffer~g	.0207872	.0187508	1.11	0.271	-.0164702	.0580445
logofissui~e	-.025687	.0364926	-0.70	0.483	-.0981971	.046823
totaldebtt~y	.0012562	.0006915	1.82	0.073	-.0001178	.0026302
pretaxinco~e	.2671709	.1140775	2.34	0.021	.0405014	.4938403
_cons	.1294399	.2367633	0.55	0.586	-.3410037	.5998835

Table 4.4 shows the result of regression model about South Korea's initial return for technology sector. There are six independent variables in the regression model for South Korea including the constant term. From the Table 4.4 we suggest that the coefficient of constant term is -0.0132 (negative) and it means the initial return is negative when other independent variables are zero.

Table 4.4: the regression result of model in South Korea

Source	SS	df	MS
Model	41.7915137	5	8.35830273
Residual	228.78505	63	3.63150872
Total	270.576563	68	3.97906711

Number of obs	69
F(5, 63)	2.30
Prob > F	0.0552
R-squared	0.1545
Adj R-squared	0.0873
Root MSE	1.9057

initialret~2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
offerprice~d	.0000451	.0000253	1.78	0.079	-5.42e-06	.0000956
logofoffer~e	-.0483746	.1385291	-0.35	0.728	-.3252029	.2284536
logofoffer~g	.222668	.2235117	1.00	0.323	-.2239844	.6693205
totaldebtt~y	.0011156	.0004641	2.40	0.019	.0001882	.0020429
pretaxinco~e	-.000304	.000171	-1.78	0.080	-.0006456	.0000377
_cons	-.1326189	1.480473	-0.09	0.929	-3.091108	2.825871

4.3.1 Offer Price

Parameter of offer price is β_1 and from this model the slop coefficient for offer price of IPO are respectively -0.018 for China and 0.0000451 for South Korea, which means the offer price of IPO increase by 1 dollar, the initial return decrease by 0.018 in China and increase by 0.000451. Offer price could indicate the quality of stock and would give investors and underwriter useful financial information.

The t ratios for offer price in the regression model are respectively -6.40 and 1.78, and the value of Prob. (t) for China is 0.000, which is less than 0.05. And the value of Prob. (t) for South Korea is 0.079, greater than 0.05 but still less than 0.1. Thus, the offer price has a significant effect on initial return and this result is consistent with previous research.

4.3.2 Log of offer size

Generally speaking, log of offer size has a negative relationship with initial return because $\beta_{2,}$ the coefficients of log of offer size are both negative. Offer size could show the level of uncertainty. Larger offer size can makes lower uncertainty of firm, which contributes to lower degree of underpricing. Traditionally, this theory could go its way in explaining IPO underpricing phenomenon.

Meantime the t ratios are -0.70 and -0.35. Prob. (t) are 0.483 and 0.728, both greater than 0.1, which indicates that log of offer size is an insignificant factor to degree of underpricing of IPOs. This may be attributed to the support for small and medium-size firms from government and public.

4.3.3 Log of offer timing

0.02 and 0.22 are β_3 the coefficients of log of offer timing, which are obviously positive. Log of offer timing has a positive relationship with initial return. Longer offer timing makes higher uncertainty.

There is a big difference between offer timing and age of firm before going to public. Offer timing is the number of days between announcement date and listing date. When a company decides to go to public and prepare well, the management announce this news to outsiders.

It would take a while to go to public and investors could buy stocks of this company. If offer timing is very long, some situation changes, which means that more uncertainty happens.

Moreover, the t ratios are 1.00 and 1.11 when Prob. (t) is 0.271 and 0.323, both more than 0.05. Thus, log of offer timing has an insignificant effect on initial return.

4.3.4 D/E ratio

β_4, the coefficients of D/E ratio are 0.0011 and 0.0012, both positive, which means it has a positive relationship with initial return.

When a firm has a heavy financial burden and borrow more money from banks than shareholders, underwriter would lower the price at which shares are sold in the first time because high D/E ratios are exposed to bad quality.

The t ratios are 1.82 and 2.4. The Prob.(t) are respectively 0.073 in China and 0.019 in South Korea, both less 0.1 and 0.019 less than 0.05. Thus, D/E ratio has a significant effect on initial return.

4.3.5 Pretax income per share

β_5 are 0.27 and -0.0003, which means pretax income per share has a positive relationship with initial return and has a negative relationship with initial return.

Pretax income per share is different from earnings per share, just considering the different tax policies would have an effect on initial return. And the t ratios are 2.34 and -1.78. Prob. (t) is 0.021 in China and 0.080 in South Korea.

This factor has a significant effect on initial return for China and has a mildly insignificant effect on initial return for South Korea. Different pretax income per share would influence the offer price that underwriter set firstly.

Chapter 5: Conclusion, Limitation and Recommendation

5.1 Conclusion of the Study

IPO underpricing is a common phenomenon in the world's stock market. Compared to well-developed countries, emerging countries have a higher level of underpricing of IPO, especially for high-technology industries. And research has found that any single factors could not well explain the degree of underpricing of IPOs.

This research tested the initial return underpricing level for a sample of total 164 IPOs for technology sector in China and South Korea from 2010 to 2014. Results have shown that offer price, D/E ratio and pretax income per share affect the degree of underpricing of IPOs. On the other hand, there are two independent variables which are not statistically significant in the model, which are offer size and offer timing.

The results of this regression model show that the R square is 0.38 for China and 0.15 for South Korea. R square values ranges from 0 to 100. An R square of 100 means that initial return is completely explained by independent variables selected. And a lower R square means that we should ignore the coefficient of independent variables.

R square is a proper statistic to examine that whether the independent variables fit with the initial return. The results indicate that this model should be improved because of lower R square especially for South Korea.

The selected independent variables could not sufficiently explain the degree of underpricing of IPOs. There is 38% of the variation in dependent variable which could explained by independent variables. And there is only 15% of the variation in dependent variable which could explained by independent variables.

5.2 Limitation of this research

Previous research usually examined that log of issuing size is an important factor on IPO underpricing in stock market. However, it is an insignificant factor in this regression model.

Due to traits of high technology firms issuing size might not have a big impact on degree of underpricing of IPOs. High technology is making an advance all the time and advanced technology could make a small firm get a good quality and future to outside investors, which could contribute to a lower underpricing of IPOs.

And those samples are from Bloomberg Program and historical lines of stock price of a few firms are delisted, which would have a small impact on the initial return between 2010 and 2014. When selecting samples, I tend to avoid the 2009 global financial crisis so IPOs samples starts from 2010. That causes not enough samples for this research especially when I only choose high technology sector.

South Korea has different economic, political conditions with China. When comparing those two countries, I choose the same factors to calculate the initial return in South Korea and China.

5.3 Recommendation

Firstly**,** R square is relatively low in this model, which indicates further researchers should select more variables to examine the initial return, such as age of issuing firm before going to public, reputation of issuing firm.

Second, large amounts of samples would make results more specific than small amounts of samples. Further researchers could get samples from 1990s', and exclude the samples that happened in financial crisis.

Third, China has a short history of financial market. Its stock market and price of IPOs is closely monitored by government and controlled by leaders of market. Thus, political elements should be considered into this regression model in further research.

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Appendix A: Data of China

Ticker	Offer Size (M)	Total Debt/Total Equity	Pre-tax Income per Share	Offer Price (Adjusted)	Offer Price
000725 CH	45713	87.97	0.22	2.1	2.1
000725 CH	9044.7	87.97	0.22	2.525	3.03
600403 CH	7539	13.86	0.7	10.42	20.84
600703 CH	3299.99	60.92	0.58	14.5333	21.8
600703 CH	3030	60.92	0.58	9.09091	30
002506 CH	2376		-1.78	11.25	36
002414 CH	1950	10.51	0.1	13	26
002230 CH	1753.31	2.93	0.43	11.4118	19.4
992 HK	1728.33	35.99	0.6	4.7	4.7
601012 CH	1575	38.41	0.17	11.6667	21
1980 HK	1485.85		-0.88	5.28	5.28
992 HK	1461.13	35.99	0.6	6.35	6.35
300080 CH	1519	42.83	0.19	16.6923	43.4
002410 CH	1450		0.71	7.86849	58
002405 CH	1433.6	2.08	0.18	14.8148	25.6
981 HK	1253.12	45.2	0.03	0.6	0.6
992 HK	1317.3	35.99	0.6	5.451	5.451
300102 CH	1327.5	2.69	0.42	18	45
002577 CH	1216	1.07	0.14	17.1946	38
300316 CH	1100.55	0.65	0.13	11	33
300150 CH	1154.65	7.81	0.29	16.495	32.99
002236 CH	1004.19	5.48	0.99	33.6	33.6
000977 CH	1000	173.54	0.37	20.055	40.11
300323 CH	1000	39.73	0.02	8.88889	20
000066 CH	1000	62.3	-0.33	4.48	4.48
434 HK	891.111		0.53	5.35	5.35
1165 HK	884.003	223.13	-1.1	2.8	2.8
002288 CH	909.999	62.15	0.14	7.71667	9.26

002474 CH	962	1.33	0.11	6.16667	37
300369 CH	867.15	4.44	0.99	25.625	41
002156 CH	890.786	32.61	0.11	10.5812	16.93
300223 CH	876		0.27	33.6923	43.8
300346 CH	829.62	0.61	0.71	33	66
601231 CH	811.68	32.81	0.62	7.6	7.6
300168 CH	840	27.06	0.3	7	28
002218 CH	808.5	32.15	0.03	14	21
300205 CH	796.4	23.31	0.23	7.40741	40
002296 CH	713.513	0.51	0.43	16.28	16.28
1900 HK	778.679	35.15	0.12	3.49	3.49
300170 CH	759.6		0.29	6.07383	25.32
300075 CH	756	8.09	0.5	16	54
002161 CH	694.105	3.59	0.07	9.63	19.26
300104 CH	730	82.22	0.31	3.67666	29.2
600845 CH	650	31.46	0.97	28	28
300130 CH	693.28	4.75	0.5	24.0722	43.33
981 HK	678.727	45.2	0.03	0.52	0.52
002642 CH	625	13.94	0.48	8.33333	25
300378 CH	623.1	8.44	1.13	15.9769	20.77
002439 CH	625		0.32	6.25	25
600460 CH	600	52.7	0.11	7.69231	20
300177 CH	585	2.62	0.31	5.85	46.8
300271 CH	569.8	0.48	0.78	15.4	30.8
002649 CH	550	9.63	0.84	14.6667	22
300166 CH	563.343	4.92	0.41	9.64198	55.36
300365 CH	521.977	12.68	0.87	24.0056	43.21
002079 CH	517.968	3.19	0.05	7.26667	13.08
600410 CH	505.1	68.98	0.11	10.7809	12.94

300212 CH	517.82	67.83	0.34	6.34583	30.46
300349 CH	465	7.02	0.77	10.3333	31
300202 CH	474.456	5.11	0.55	3.4537	22.38
600460 CH	437.76	52.7	0.11	3.69231	4.8
300295 CH	453.9		2.55	34	34
992 HK	474.257	35.99	0.6	5.35	5.35
002230 CH	445.27	2.93	0.43	15.9412	40.65
300229 CH	450		0.35	8.82353	15
002649 CH	400.4	9.63	0.84	26	26
1900 HK	434.615	35.15	0.12	4.8	4.8
002504 CH	432	23.66	-0.12	12.3077	16
000997 CH	434	26.93	0.57	7.5	7.5
300096 CH	435.6	1.01	0.27	9.9	19.8
300300 CH	396	8.1	0.33	8.18182	18
300297 CH	392	36.02	0.18	8	16
300277 CH	391	17.36	0.04	11.5	23
002657 CH	383.9	38.97	0.61	14.6667	22
600728 CH	358.563	42.05	0.2	10.51	10.51
002185 CH	365.848	46.3	0.35	6.95	11.12
300253 CH	371.25	0.51	0.39	6.87659	27.5
1165 HK	359.93	223.13	-1.1	1.11	1.11
002178 CH	340	28	0.16	4.28571	9
300287 CH	315	29.18	0.31	5	15
300104 CH	300.001	82.22	0.31	41.1	41.1
300377 CH	298.883	7.06	0.98	21.58	21.58
300241 CH	291.6	19.11	0.3	5.4	10.8
600203 CH	278	96.51	0.33	6.43	6.43
300379 CH	282.883	37.47	1.08	22	22
002253 CH	263.068	0.1	0.57	18.0062	28.81

300348					
CH	260	0.31	0.45	20	20
981 HK	235.763	45.2	0.03	0.53	0.53
300236					
CH	238.005	8.52	0.55	11.07	11.07
1450 HK	217.015	61.24		1.08	1.08
002115					
CH	210.936	47.59	-0.34	8.61667	15.51
300350					
CH	205.865	45.69	0.43	9.5	9.5
300231					
CH	196.2	8.89	0.26	3.63333	19.62
300290					
CH	188.87	20.54	0.45	5.555	11.11
712 HK	200.778	29.12	-0.1	2.3	2.3
002169					
CH	189.7	76.23	0.12	10.6667	16
712 HK	167.621	29.12	-0.1	1.74	1.74
981 HK	161.586	45.2	0.03	0.475	0.475
992 HK	177.458	35.99	0.6	5.03	5.03
300390					
CH	165.165	17.81	0.72	8.47	8.47
1522 HK	162.236	2.88	0.07	1	1
686 HK	153.761	516.73	-1.18	1.45	1.45
000948					
CH	122.7	40.55	0.06	8.18	8.18
8045 HK	52.6401	56.19	0.02	0.355	0.355
712 HK	46.2531	29.12	-0.1	1.15	1.15

Ticker	Closing Price	log of issuing size	log of offer timing	initial return
000725 CH	2.31	10.730138	2.079441542	0.1
000725 CH	2.6	9.10993423	0	0.024752475
600403 CH	8.94	8.927844826	0	-0.071017274
600703 CH	8.78	8.101674717	0	-0.263912844
600703 CH	13.494	8.016317899	0	0.146769667
002506 CH	14.887	7.77317368	4.094344562	0.101027778
002414 CH	12.735	7.575584652	5.111987788	-0.010192308
002230 CH	22.941	7.469260709	0.693147181	0.59428866
992 HK	4.92	7.454910903	1.098612289	0.046808511
601012 CH	10.972	7.362010551	4.644390899	-0.033080952
1980 HK	5.72	7.303742278	2.63905733	0.083333333
992 HK	6.12	7.286965388	0.693147181	-0.036220472
300080 CH	16.15	7.325807503	4.605170186	-0.012495392
002410 CH	7.691	7.279318835	4.86753445	-0.003060172
002405 CH	16.649	7.267944042	4.753590191	0.071648438
981 HK	0.64	7.13339172	0.693147181	0.066666667
992 HK	5.43	7.183339466	0	-0.003852504
300102 CH	31.872	7.191052753	4.317488114	0.308266667
002577 CH	14.52	7.103322063	3.784189634	-0.070384211
300316 CH	11.627	7.003565334	4.49980967	0.019
300150 CH	29.7	7.051552547	3.784189634	0.40027281
002236 CH	11.42	6.911936525	1.098612289	-0.660119048
000977 CH	25.655	6.907755279	1.098612289	0.139616056
300323 CH	8.853	6.907755279	4.418840608	-0.0017945
000066 CH	9.6	6.907755279	0.693147181	1.142857143
434 HK	6.09	6.792468999	2.564949357	0.138317757
1165 HK	4.69	6.784460456	3.583518938	0.675
002288 CH	9.983	6.813443501	1.098612289	0.24474406
002474 CH	5.633	6.869014451	3.80666249	-0.014423514

300369 CH	36.9	6.765211972	6.533788838	0.275
002156 CH	6.63	6.792104219	2.995732274	-0.233384525
300223 CH	31.7	6.775366091	5.267858159	-0.045486301
300346 CH	40.91	6.720967765	4.96284463	0.119848485
601231 CH	12.58	6.699106174	6.445719819	0.655263158
300168 CH	6.15	6.733401892	4.532599493	-0.030357143
002218 CH	19.007	6.695180679	0.693147181	0.238428571
300205 CH	6.672	6.680101572	3.044522438	-0.01838525
002296 CH	20.85	6.570200657	1.098612289	0.280712531
1900 HK	3.49	6.657598894	2.833213344	0
300170 CH	5.856	6.632791979	4.189654742	-0.008603081
300075 CH	20.148	6.628041376	3.688879454	0.076814815
002161 CH	10.155	6.542623246	0.693147181	0.027258567
300104 CH	5.409	6.593044534	4.127134385	0.059326712
600845 CH	30.51	6.476972363	0	0.089642857
300130 CH	26.583	6.541433958	3.970291914	0.057945996
981 HK	0.53	6.520218985	0.693147181	0.019230769
002642 CH	9.657	6.43775165	3.970291914	0.0529468
300378 CH	25.308	6.43470702	6.343880434	0.449258546
002439 CH	8.02	6.43775165	4.49980967	0.0708
600460 CH	9.454	6.396929655	0	0.0880845
300177 CH	7.254	6.371611847	0	0.03
300271 CH	8.351	6.345285422	5.236441963	-0.228863636
002649 CH	13.287	6.309918278	4.127134385	-0.062713636
300166 CH	8.351	6.333888679	4.127134385	-0.023319725
300365 CH	34.856	6.257623526	6.315358002	0.25110854
002079 CH	7.922	6.249913464	1.098612289	0.050101682
600410 CH	10.948	6.224756429	0	0.012913447
300212 CH	5.771	6.249627692	3.850147602	-0.018871635

300349 CH	11.067	6.142037406	5.087596335	0.023667742
300202 CH	4.012	6.162168885	3.610917913	0.024946381
600460 CH	4.808	6.081670815	0	0.232435417
300295 CH	59.4	6.117876909	4.9698133	0.747058824
992 HK	5.3	6.161749369	0.693147181	-0.009345794
002230 CH	17.431	6.09868084	0.693147181	0.036649446
300229 CH	9.912	6.109247583	5.135798437	0.072564667
002649 CH	29.22	5.992464047	1.386294361	0.123846154
1900 HK	4.95	6.074460582	0	0.03125
002504 CH	22.492	6.068425588	3.912023005	0.63651875
000997 CH	10.93	6.073044534	0.693147181	0.457333333
300096 CH	14.615	6.076724391	4.624972813	0.238131313
300300 CH	10.159	5.981414211	4.465908119	0.109843333
300297 CH	9.055	5.97126184	4.700480366	0.0659375
300277 CH	15.6	5.96870756	5.010635294	0.17826087
002657 CH	26.707	5.950382102	4.248495242	0.547286364
600728 CH	14.19	5.882104377	0	0.350142721
002185 CH	6.056	5.902217947	0.693147181	-0.080395683
300253 CH	10.745	5.91687569	3.761200116	0.140669455
1165 HK	0.99	5.885909568	2.944438979	-0.108108108
002178 CH	5.995	5.828945618	0.693147181	0.189921111
300287 CH	5.217	5.752572639	4.465908119	0.014466667
300104 CH	36.89	5.703785808	1.609437912	-0.10243309
300377 CH	31.08	5.700052192	6.405228458	0.440222428
300241 CH	9.425	5.675383	3.871201011	0.372685185
600203 CH	8.34	5.627621114	0.693147181	0.297045101
300379 CH	31.68	5.645033385	6.345636361	0.44
002253 CH	18.119	5.572412554	2.995732274	0.003915307
300348	23.4	5.560681631	5.117993812	0.17

CH				
981 HK	0.55	5.462827063	0	0.037735849
300236				
CH	15.8	5.472291682	4.248495242	0.427280939
				-
1450 HK	1.07	5.379966476	2.564949357	0.009259259
002115				-
CH	7.478	5.35155477	0.693147181	0.073415216
300350				
CH	14.63	5.327220614	5.564520407	0.54
300231				
CH	4.661	5.279134547	4.158883083	0.052378695
300290				
CH	8.76	5.241058948	4.624972813	0.288478848
712 HK	2.39	5.30219982	1.386294361	0.039130435
002169				
CH	13.8	5.245443877	0.693147181	0.19583125
712 HK	1.83	5.121705479	0.693147181	0.051724138
981 HK	0.48	5.085037509	0	0.010526316
992 HK	5.08	5.178733961	0.693147181	0.009940358
300390				
CH	8.47	5.106944974	2.995732274	0
1522 HK	0.73	5.089052065	2.564949357	-0.27
686 HK	1.54	5.035399449	2.397895273	0.062068966
000948				-
CH	8.09	4.809742352	0.693147181	0.011002445
8045 HK	0.44	3.963478187	2.995732274	0.23943662
712 HK	1.24	3.834128489	1.791759469	0.07826087

Appendix B: Data of South Korea

Ticker	Offer Size (M)	Offer Price	Offer Price (Adjusted)	Pre-tax Income per Share
000660 KS	923150	23500	23500	4217.03
005930 KS	340074	1260000	1260000	185034
000660 KS	229761	23300	23300	4217.03
046890 KS	186960	45600	45600	1356.08
121440 KS	170000	85000	28333.3	1638.25
000660 KS	124416	28200	28200	4217.03
110570 KS	85490	4000	3594.56	-539.7
063080 KS	62169.6	64000	64000	2140.82
153490 KS	44100	4900	4900	-213.08
042700 KS	38195.2	15200	15200	590.52
061970 KS	37600	4700	4700	-12.51
154040 KS	24000	24000	24000	6910.54
114120 KS	28326.6	23500	9400	-1155
123860 KS	24440	52000	17343	483.83
092220 KS	20000	500	3069.45	-691.79
141000 KS	18285	15900	15900	395.72
085810 KS	17000	8500	8500	983.19
123100 KS	16200	13500	13500	18.01
088390 KS	15750	11250	9161.53	3182.46
089030 KS	14950	23000	7666.67	597.83
155650 KS	11677.9	6000	6000	603.04
115450 KS	11510.9	11000	11000	-518.76
097800 KS	10109.6	4000	4000	-689.3
131400 KS	10800	2700	2700	148.01
089850 KS	11000	11000	11000	-241.95
053300	9720	1800	1800	241.88

KS 114810				
KS 073570	9884.25	4500	4500	897.92
KS 150900	10140	3380	3380	-929.52
KS 074000	9280	5800	5800	226.94
KS 121850	8691.93	1185	5925	-477.97
KS 064520	8850	7500	7500	-69.23
KS 096690	8338.5	1635	1374.73	77.23
KS 119830	8250	5500	2750	368.48
KS 059120	8190	9100	9100	55.31
KS 099830	7000	7000	7000	724.93
KS 064290	7582	8500	1668.9	-151.18
KS 066700	7000	7000	7000	-719.78
KS 171010	4873.42	8330	8330	45.19
KS 090850	4875	3900	3900	558.51
KS 131090	4400	4400	4400	522.71
KS 070300	4458.23	4900	4900	263
KS 068940	4375	5000	5000	375.99
KS 072950	4200	2800	2800	44.84
KS 079970	3432	4400	4400	363.08
KS 041460	3160	8000	4000	407.58
KS 025560	2240	1600	1600	293.27
KS 053810	2084.99	208	208	-27.81
KS 078860	999.474	742	742	-1033.83
KS 040350	999.998	2610	2610	-187.5
KS 096040	998.8	1135	1135	17.74
KS 058370	999.975	1005	743.425	-58.73
KS 052020	1000	728	728	-233.2
KS 024850	1000.18	3770	3770	-1201.28
	999.02	1045	1045	-143.16

KS 025560				
KS 078860	999.012	245	245	-27.81
KS 065560	999.999	700	700	-187.5
KS 033430	998.64	1520	1520	-344.24
KS 051780	999.972	564	564	-106.02
KS 023770	999.75	1550	1550	-63.17
KS 049470	999.99	615	3075	-3200.12
KS 078860	1000	1495	1312.28	5.61
KS 096630	1000.18	4665	4665	-187.5
KS 033430	993.127	1445	1011.5	146.34
KS 039850	990	500	500	-106.02
KS 074000	999.18	1260	2520	-633.31
KS 028040	999.822	1065	5325	-477.97
KS 043580	1000.09	2565	2565	-621.14
KS 071930	999.1	1030	1030	41.49
KS 064520	990	500	500	-203.08
KS 053810	999.999	693	693	77.23
KS 054180	942.56	548	548	-1033.83
KS 058370	997.05	3450	3450	270.05
KS 058370	298.697	601	601	-233.2
KS	260.49	570	570	-233.2

Appendix C

Equally weighted average initial returns for 49 countries

Country	Source	Sample Size	Time Period	Avg. Initial Return
Argentina	Eijgenhuijsen & van der Valk	20	1991-1994	4.4%
Australia	Lee, Taylor & Walter; Woo; Pham; Ritter	1,562	1976-2011	21.8%
Austria	Aussenegg; Ritter	102	1971-2010	6.3%
Belgium	Rogiers, Manigart & Ooghe; Manigart DuMortier; Ritter	114	1984-2006	13.5%
Brazil	Aggarwal, Leal & Hernandez; Saito; Ushisima	275	1979-2011	33.1%
Bulgaria	Nikolov	9	2004-2007	36.5%
Canada	Jog & Riding; Jog & Srivastava; Kryzanowski, Lazrak & Rakita; Ritter	696	1971-2010	6.7%
Chile	Aggarwal, Leal & Hernandez; Celis & Maturana; Ritter	65	1982-2006	8.4%
China	Chen, Choi, & Jiang; Jia & Zhang	2,102	1990-2010	137.4%
Cyprus	Gounopoulos, Nounis, and Stylianides	66	1999-2011	20.8%
Denmark	Jakobsen & Sorensen; Ritter	164	1984-2011	7.4%
Egypt	Omran	53	1990-2000	8.4%
Finland	Keloharju	162	1971-2006	17.2%
France	Husson & Jacquillat; Leleux & Muzyka; Paliard & Belletante; Derrien & Womack; Chahine; Ritter; Vismara	697	1983-2010	10.5%
Germany	Ljungqvist; Rocholl: Ritter; Vismara	736	1978-2011	24.2%
Greece	Nounis, Kazantzis & Thomas; Thomadakis, Gounopoulos & Nounis	373	1976-2011	50.8%
Hong Kong	McGuinness; Zhao & Wu; Ljungqvist & Yu; Fung, Gul, and Radhakrishnan; Ritter	1,259	1980-2010	15.4%
India	Marisetty and Subrahmanyam; Ritter	2,964	1990-2011	88.5%
Indonesia	Suherman	386	1990-2011	25.7%
Iran	Bagherzadeh	279	1991-2004	22.4%
Ireland	Ritter	31	1999-2006	23.7%
Israel	Kandel, Sarig & Wohl; Amihud & Hauser; Ritter	348	1990-2006	13.8%
Italy	Arosio, Giudici & Paleari; Cassia, Paleari & Redondi; Vismara	273	1985-2009	16.4%
Japan	Fukuda; Dawson & Hiraki; Hebner & Hiraki; Pettway & Kaneko; Hamao, Packer, & Ritter; Kaneko & Pettway	3,100	1970-2010	40.4%
Jordan	Marmar	53	1999-2008	149.0%
Korea	Dhatt, Kim & Lim; Ihm; Choi & Heo; Mosharian & Ng; Cho; Joh; Ritter	1,593	1980-2010	61.6%
Malaysia	Isa; Isa & Yong; Yong; Ma	413	1980-2009	62.6%

Country	Source	Sample Size	Time Period	Avg. Initial Return
Mexico	Aggarwal, Leal & Hernandez; Eijgenhuijsen & van der Valk	88	1987-1994	15.9%
Netherlands	Wessels; Eijgenhuijsen & Buijs; Jenkinson, Ljungqvist, & Wilhelm; Ritter	181	1982-2006	10.2%
New Zealand	Vos & Cheung; Camp & Munro; Ritter	214	1979-2006	20.3%
Nigeria	Ikoku; Achua	114	1989-2006	12.7%
Norway	Emilsen, Pedersen & Saettem; Liden; Ritter	153	1984-2006	9.6%
Philippines	Sullivan & Unite; Ritter	123	1987-2006	21.2%
Poland	Jelic & Briston; Ritter	224	1991-2006	22.9%
Portugal	Almeida & Duque; Ritter	28	1992-2006	11.6%
Russia	Ritter	40	1999-2006	4.2%
Saudi Arabia	Al-Anazi, Forster, & Liu	76	2003-2010	264.5%
Singapore	Lee, Taylor & Walter; Dawson; Ritter	591	1973-2011	26.1%
South Africa	Page & Reyneke; Ali, Subrahmanyam & Gleason; Ritter	285	1980-2007	18.0%
Spain	Ansotegui & Fabregat; Alvarez Otera	128	1986-2006	10.9%
Sri Lanka	Samarakoon	105	1987-2008	33.5%
Sweden	Rydqvist; Schuster; Simonov; de Ridder	406	1980-2011	26.1%
Switzerland	Kunz,Drobetz, Kammermann & Walchli; Ritter	159	1983-2008	28.0%
Taiwan	Chen	1,312	1980-2006	37.2%
Thailand	Wethyavivorn & Koo-smith; Lonkani & Tirapat; Ekkayokkaya and Pengniti	459	1987-2007	36.6%
Turkey	Kiymaz; Durukan; Ince; Kucukkocaoglu	355	1990-2011	10.3%
United Kingdom	Dimson; Levis	4,877	1959-2011	16.1%
United States	Ibbotson, Sindelar & Ritter; Ritter	12,246	1960-2011	16.8%